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Enhancing post-disaster reconstruction capacity through lifelong learning in higher education

Abstract

Purpose: Due to the complexities involved in disasters and due to the peculiar nature of post-disaster reconstruction, built environment professionals require continuous updating of their skills and knowledge to contribute effectively to disaster resilience. The purpose of this research is to identify the ways in which higher education institutions can address this need through the provision of lifelong learning.

Methodology: This paper is based on both a literature review and on empirical evidence obtained through interviews, a workshop and group validation.

Findings: The challenges faced by HEIs in accommodating lifelong learning are presented. Furthermore, good practice guidelines are provided to enable HEIs to respond effectively to industry requirements; to provide lifelong learning via through-life studentship; to promote collaboration amongst HEIs, industries, professional bodies and communities, and to promote the adoption, diffusion and exploitation of the latest learning and teaching technologies.

Research limitations: The empirical focus of the research is limited to three (3) EU countries, namely UK, Lithuania and Estonia. This paper focuses on role of HEIs in enhancing the disaster risk reduction capacity in the built environment, especially at the stage of post-disaster reconstruction.

Practical implications: The recommendations provided on good practice suggest how HEIs can integrate disaster related knowledge into their curriculum faster than previously and how they are able to assist their educators and learners in building up their knowledge base on a continuous basis.

Social implications: Capacity building in enhancing disaster risk reduction during the post-disaster reconstruction stage through the provision of lifelong learning will create social implications within the responsiveness of built environment professionals to cater for disaster resilience.

Original / value: The appropriateness of lifelong learning as an approach to disaster management education is justified. The challenges HEIs face in accommodating lifelong learning and the recommendations on good practice guidelines in order to make the HEIs more responsive to educational needs are discussed.

Keywords: Disaster management education, Lifelong learning, Higher education, Built environment skills needs, Disaster risk reduction

Article Classification: Research paper

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Introduction

Disasters cause physical, social and economic damage. Disaster risk reduction (DRR) has been identified as one of the methods that can mitigate such damage caused by disasters and increase society's resilience. UNISDR (2009, pp10-11) has defined disaster risk reduction as "*the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events*".

The built environment is a key contributor to the core framework for most human activity (Bosher, 2008). Most disasters damage components of the built environment such as buildings, roads, bridges, utility services, harbours, etc. Therefore, clearing, salvaging, rehabilitation and reconstruction work fully or partly require serious efforts by the construction sector (Thayaparan *et al*., 2010). Professionals, who belong to various disciplines and are attached to the built environment sector, play a vital role as the built environment is expected to withstand disasters and, where necessary, contribute to the rebuilding effort. Due to the peculiarities of post-disaster reconstruction and to the emerging need to incorporate disaster risk reduction in all development activities, undertaking continuous skills' development to respond to disaster situations is a key requisite for built environment professionals in developing the disaster risk reduction capacity. Therefore, the education and training of such professionals is a major aim of most built environment educational programmes in Higher Education Institutions (HEIs).

Mercer (2012) observes the fact that, although traditionally knowledge of hazards has been a product of research undertaken within the physical sciences' disciplines, both physical and social sciences have an important role to play in knowledge production for disaster risk reduction. HEIs, as one of the main providers of education, are required to deliver updated knowledge and skills to construction professionals on a continuous basis. A mismatch between graduate skills and labour market requirements has been evident particularly in the built environment sector (OECD, 2008). The shortage of people with appropriate skills (Eagan, 1998; Construction Skills, 2007) indicates a lack of skills' supply in the construction industry. Furthermore, the dynamic nature of the labour market and the need to have specific skills to cater for situational demands such as disaster risk reduction have left employees with no option but to enhance their skills with specific knowledge and expertise in order to act effectively and retain their position in the industry.

The focus of this paper is on reform within HEIs in enhancing the disaster risk reduction capacity in the built environment, especially in the post-disaster reconstruction phase. The contents of this paper are based on primary and secondary data. The literature discussed below reviews the peculiarities of post disaster reconstruction and then looks at mapping the skills of built environment professionals with their role during the reconstruction phase. The paper then analyses the learning approaches used in providing disaster management education and justifies lifelong learning as an appropriate

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approach. The research methodology is presented thereafter. Finally, there is a discussion on the challenges faced by HEIs in incorporating a lifelong learning approach within the system and on good practices within higher education that can provide lifelong learning for disaster management education.

The peculiarities of post-disaster reconstruction

After a disaster, although the time scale for rebuilding is shorter than the normal construction (Masurier *et al*., 2006), the scale of the construction activities required is relatively high. In order to achieve a timely restoration of the affected community, effective approaches in terms of design, technology, materials and construction methods need to be adopted. Low-cost construction has become another aspect of post-disaster reconstruction (Lizarralde, 2000). Due to the need for speedy re-construction at low cost, the use of the local resources such as materials, labour and plant are encouraged. The involvement of stakeholders is different in disaster reconstruction when compared to stakeholder involvement in typical construction projects. In addition to the traditional stakeholders involved in the construction process, there are additional stakeholders such as non-governmental organisations, donors, the government, local authorities, policy makers and the local community. Therefore, higher levels of communication, coordination and management (Rotimi *et al.*, 2006) are required among the stakeholders. Trust and respect between the stakeholders in order to build up good relationships among the parties is also of paramount importance. Furthermore, due to the involvement of international organisations and donors, the stakeholders may require different methods and tools for project planning and for monitoring which are then likely to highlight the needs for new skills. There might be more than one donor involved in a single project, thus the funding arrangements can be more complicated than in a typical construction. Adopting disaster risk reduction strategies into the process of construction is a very important feature not only during the post-disaster stage but also they can be applied into any construction project in order to minimise disaster risks in the future. Developing and adopting resilient technologies is vital in order to prevent vulnerabilities to future disasters. Therefore, the key stakeholders within construction projects should be responsible for integrating resilience into the design, construction and operation process (Bosher *et al.*, 2007a).

The peculiar nature of the disaster re-construction process discussed above necessitates the acquisition of specialised knowledge and skills by built environment professionals in order to respond to the situation effectively and efficiently. Effective education, training and awareness raising programmes have been identified as key requisites in managing disasters successfully (Pathirage *et al.*, 2012). The next section discusses the skills and capacities required by built environment professionals in a post-disaster situation.

Skills and capacities of built environment professionals in the post-disaster context

The built environment professional has a vital role to play in the post-disaster reconstruction stage. This role is quite different to their usual role due to the peculiar nature of disaster reconstruction as discussed in the previous section. The UK Commission for Employment and Skills (UKCES, 2008)

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has identified employability skills under two categories, namely ‘Personal skills’ and ‘Function skills’. Personal skills consist of self-management; thinking and solving problems; working together and communicating, and understanding the business, whereas functional skills consist of effectively using numbers, IT and language. In addition to the employability skills, which are those basic skills and capabilities required for getting, keeping and doing well in a job (Robinson, 2000), built environment professionals need to enhance their skills to contribute to disaster reconstruction activities. Figure 1 maps the skills and knowledge requirements that are prerequisites within the role of built environment professionals during the phase of disaster reconstruction.

Figure1: Mapping the skills and capacities of the built environment professionals with their role during post disaster reconstruction

Figure 1 shows the skills required by built environment professionals when performing post-disaster reconstruction activities. Employers, when recruiting, mainly look for a good degree; specific skills; generic or transferable skills; experience, and personal attributes. This shows that, in addition to academic achievement, one should be able to demonstrate a good level of skills and competencies in order to succeed in employment in today’s competitive world. Thus, professionals are required to develop their capacity to cater for the needs of the labour market. Capacity development is defined as “*the process by which people, organizations and society systematically stimulate and develop their capacities over time to achieve social and economic goals, including through improvement of knowledge, skills, systems, and institutions*” (UNISDR, 2009, p2). Though there have been many attempts to increase disaster resilience through capacity building and development initiatives, gaps in capacity are still in existence in various forms. Among such gaps identified in disaster risk reduction in the built environment are a lack of disaster management related awareness; a lack of proper education and training, and a lack of skilled and trained human resources (Bosher *et al*., 2007b). Therefore, these gaps indicate that ‘education’ is a key to addressing such capacity gaps.

Education and training in order to develop built environment professionals are generally provided by HEIs; vocational education and training providers; built environment professional bodies; construction organisations, and training and development authorities. However, significant number of built environment professionals obtain their professional education from HEIs. As universities are at the centre of knowledge production, of dissemination of knowledge and of transfer of knowledge into innovation, they could greatly benefit from advocacy for investment in research and development (Larsson, 2006). Therefore, HEIs obviously have key responsibilities in ensuring that appropriate education and training are provided for the built environment professionals who are also involved in the design and construction process of a disaster resilient built environment. The next section analyses the formal learning approach in comparison with other approaches to identify the most suitable approach that could be adopted by HEIs to enhance the DRR capacity of built environment professionals.

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Learning approaches in providing DRR knowledge and skills

Learning approaches can broadly be classified into three categories namely formal, non-formal and informal learning. In brief, formal learning is achieved through organised programmes delivered through schools and other providers and is recognised by a qualification or part of a qualification; non-formal learning is achieved through an organised programme or instruction but is not recognised by a qualification, and informal learning is achieved outside organised provision (OECD, 2004). HEIs largely adopt formal learning to teach built environment students. Having realised the educational needs for disaster resilience, HEIs have attempted to integrate disaster management knowledge within their curriculum either by teaching it as a programme or a module or by providing opportunities for students to research on the subject. However, the need to improve the incorporation of such knowledge within the higher education curriculum still exists (Perdikou et. al., 2014).

The key existing approaches to disaster management education empirically identified through the workshop were the undergraduate/postgraduate programmes conducted by the HEIs; the final project/dissertation in undergraduate and postgraduate programmes; Continuing Professional Development (CPD) and short courses conducted by HEIs, professional bodies and other institutes; widely available knowledge on the world wide web; other traditional modes like text books, magazines and other publications; self study, and learning by experience (see Siriwardena *et al*., 2013). Among these, HEIs mainly contribute to approaches that are more formal. Despite the fact that most HEIs prefer the formal learning approach in teaching built environment students, this approach has disadvantages such as a lack of industry and community engagement, a lack of multidisciplinary teaching and learning provisions, a lack of flexibility in rapid responses to dynamic industry requirements and a relatively shorter period of student engagement (Siriwardena *et al*., 2013).

Higher education programmes that prepare students for careers in disaster resilience have an important contribution to make in terms of the contents of the curriculum, the educational methods and the study materials (Amaratunga *et. al*., 2011). However, the complex and multidisciplinary nature of disaster management education poses a challenge for the higher education institutions to achieve this goal purely through the delivery of a formal curriculum. Furthermore, higher education programmes should be more innovative in providing opportunities to work in close collaboration with industry, communities, humanitarian agencies, private sectors and other higher education institutions. As mentioned, institutionalised formal learning approaches often lack these qualities. Furthermore, the time consuming process of making changes to formal curricula limits the opportunities for HEIs to respond faster to the changing needs of industry. Considering that there are flaws in the provision of disaster management education through regular courses, it has been suggested that such knowledge should be provided through short courses (Shaw, 2008; Siriwardena *et al*., 2013). As such the non-formal approaches, such as CPD, short courses, seminars and workshops, deliver a more responsive and effective way of providing disaster risk reduction knowledge in a timely manner due to their flexible nature as compared to the formal learning approach. However, these sessions are largely organised by professional bodies, training bodies, humanitarian organisations and private sectors

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rather than higher education institutions. The low level of engagement that HEIs have with industries, professional bodies and communities has been pointed out to be a major obstacle in this type of non-formal knowledge sharing practices (Siriwardena *et al*., 2013). Furthermore, continuous skill development in order to respond to disaster situations has been identified as a key requisite for construction professionals in developing the disaster risk reduction capacity. However, the short duration of student engagement, which is usually limited to the course duration in a formal curriculum, prevents HEIs retaining their graduates in order to build their knowledge base on continuous basis. Generally, continuous learning is obtained through the non-formal approaches that have been mentioned above and through informal approaches such as self-study, learning by doing and learning through experience.

The section above discussed the problems associated with the formal learning approach which is mainly provided by HEIs and justified how non-formal and informal learning can be more responsive in enhancing disaster related knowledge and skills. It also indicates the limited opportunities HEIs have in providing non-formal and informal learning. This demands HEIs to accommodate both non-formal and informal learning approaches, in addition to their formal learning. Furthermore, each form of learning approach fulfils some partial needs required by those who want to qualify to perform in the labour market. If all of these approaches are obtained collectively, it will enable individuals to participate effectively and fully in disaster risk reduction. As such, creating a comprehensive educational system covering all types of learning approaches will be effective. HEIs are, therefore, encouraged to combine different learning approaches within their system of education to respond to skills' requirements in an effective and timely manner. Lifelong learning generally includes all three approaches in its learning system (Commission of the European Communities, 2000). Therefore, the suggestion has been made to adopt a lifelong learning approach within the system of higher education in order to provide continuous updating of disaster related skills and knowledge within the built environment professionals. The next section discusses the choice of implementing a lifelong learning approach within disaster management education.

Lifelong learning as an approach within disaster management education

As a lifelong learning approach can accommodate formal, non-formal and informal learning approaches, the challenges identified within the formal learning process adopted by HEIs can be partially or fully minimised by taking a lifelong learning approach. Furthermore, recognition of non-formal and informal learning has become a burning issue (see Hozjan, n.d.) due to the changing nature of the labour market requirements. OECD (2005, p14) also emphasises that "there is an increasing evidence that countries realise that their qualifications systems need to be able to change and evolve to meet rapidly-changing needs in the world of learning and in the labour market". Thus, adopting a lifelong learning approach in the context of disaster management education will be a solution in updating the knowledge and skills of built environment professionals on a continuous basis.

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The concept of lifelong learning as an educational strategy emerged some three decades ago through the efforts of the Organisation for Economic Co-operation and Development (OECD), United Nations Educational Scientific and Cultural Organisation (UNESCO) and the Council of Europe. It was also agreed by these three bodies that initial education and training needed to be followed by lifelong opportunities accessible to all citizens, irrespective of their social or economic status. OECD (2003) defines lifelong learning as all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competences within a personal, civic, social and/or employment-related perspective.

The CITB Construction Skills (2009) has identified that more employers are supporting lifelong learning and have begun to use associated products and toolkits. However, little has been done by the HEIs to adopt lifelong learning within their educational systems despite the fact that lifelong learning is a core concept in modern education. Thus, the readiness of HEIs to provide 'lifelong learning' within their existing system of higher education is still questionable. This suggests that there should be reform in the system of higher education to make it more responsive to industry requirements and that HEIs should become continuing education centres by accommodating lifelong learning within their systems. In this context, this research has identified the challenges for HEIs in accommodating lifelong learning and has suggested some good practice guidelines for HEIs to incorporate a lifelong learning approach in order to enhance the disaster risk reduction capacities of built environment professionals. The next section discusses the research methodology followed by a presentation on the results and discussion.

Research methodology

Data collection with multiple sources of evidence

The methodology adopted for this research comprised a number of methods, namely, review of the literature, interviews, workshops and group validation. The outcome of the literature review made a significant input into the identification of the skills needed in disaster management. It also strengthened the basis of inquiry for the empirical data collection and analysis. Semi-structured in-depth interviews were conducted with higher education leaders, both academic and management, to obtain expert knowledge concerning the reform of HEIs in order to accommodate the lifelong learning approach. Ten experts comprising Heads of Schools, Deans of Faculties, Heads of Governance Units, professors, programme directors and senior lecturers were interviewed for this purpose. Two sets of interview guidelines were prepared to gather data from academic staff and management staff. The management staff were mainly from university governance and all the academic staff chosen for the data collection were from a built environment background with a considerable level of expertise in teaching or in researching disaster management. The main questions posed to the academic leaders were: how to up-date the professional knowledge that is offered to the students? What training is available for teaching staff to update their knowledge? With what frequency do they update the syllabus? What mechanisms are used to capture labour market skills' requirements? What are the challenges and opportunities available in providing formal and non-formal learning? What

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opportunities are available for students to engage with industries and communities? Do they engage with students after the students have left HEIs to get feedback or to build a knowledge base on a continuous basis? What is the importance of providing lifelong learning and what are the challenges associated with accommodating lifelong learning? From the respondents from HEI governance, the main issues captured concerned the approval process for changing the curriculum or the mode of delivery or introducing new teaching and learning technologies; the formal level of engagement that HEIs have with industries, professional bodies, other HEIs and communities; any mechanisms to capture and respond quickly to labour market requirements; the level of willingness of HEI governance to accommodate lifelong learning; the readiness of HEIs in accommodating lifelong learning – or constituting HEIs as continuing education centres.

In addition, an organised workshop as part of an international research conference on disaster resilience was conducted to capture expert knowledge on disaster management from selected participants representing a multitude of stakeholders within disaster management education. Fifteen participants comprising academics, researchers and representatives of government and semi-government organisations relating to built environment and disaster management attended the workshop. Such a group was selected in order to benefit from their diverse expertise in the disaster resilience area, thereby providing the much needed multi-faceted data for this research. The role of HEIs in providing lifelong learning in the context of disaster management was thoroughly discussed during the workshop. The participants were divided into two breakout groups to discuss the issues at a greater depth. One group focused on the issues relating to disaster management skills and knowledge, both traditional and add-ons, and the criteria for prioritising the delivery of such skills and knowledge to the built environment professionals. The second group focused on the current approaches to disaster management skills' acquisition and the role of HEIs. Then all the participants provided input into a discussion on the importance of providing lifelong learning and the ways in which HEIs can contribute to accommodating lifelong learning in the context of disaster management.

The suggested recommendations on how HEIs can contribute to the provision of lifelong learning in the context of disaster management in the built environment were also validated through a group validation exercise in the form of an organised meeting of a panel of experts. The group of 7 experts comprised built environment disaster management educationalists in HEIs and researchers.

Data analysis

The data collected through the in-depth interviews were analysed to identify the challenges faced by HEIs in providing lifelong learning effectively and to suggest ways of overcoming some of the challenges so that HEIs can enhance the skills and knowledge of built environment professionals through the provision of lifelong learning. The suggestions focused on effective responses to industry requirements by incorporating new and updated knowledge and technologies into HEI learning systems; on fostering collaboration with other HEIs, industries and communities, and on establishing through-life studentships. The workshop data were analysed with the intention of validating the conclusions drawn from the in-depth interviews and further establishing the lifelong learning

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challenges and opportunities for HEIs in the context of disaster management. All the in-depth interviews and the workshop discussions were audio recorded with the consent of the respondents. Detailed transcripts of the interview and workshop data were prepared and were subjected to a content analysis, whereby thematic codes were established in the context of disaster management to analyse the system of HEIs in terms of providing 'continuous knowledge updates', 'establishing through-life studentships' and 'challenges and opportunities for lifelong learning'.

The respondents selected for both the interviews and the workshop possessed expert knowledge and experience in the fields of higher education systems, the built environment, disaster management and also had sufficient knowledge of the process of lifelong learning. As such, the data collected from them were highly regarded. Additionally, due to the value-laden nature of the qualitative research, the authors' own knowledge and experience contributed towards connecting and interrelating the data, interpreting and providing meaning to the data. However, the authors have not purely relied on their own value-laden knowledge in interpreting the respondents' data. Therefore, the conclusions drawn by the authors from the interviews and the workshop were further validated by the group of experts comprising educationalists and researchers in the field of disaster management higher education. The main objective of the group validation was to endorse the necessity for lifelong learning implementation by HEIs, despite the challenges and difficulties they face, and to judge the level of acceptability by HEIs in accommodating the recommendations proposed by the respondents. In addition, the conclusions were validated with the literature. As such, the findings and recommendations presented in this paper are thoroughly interpreted, evaluated and validated by the literature, by expert knowledge and by the own knowledge and understanding of the authors.

Findings and discussion

The role of HEIs in providing lifelong learning for built environment professionals was investigated in this piece of research in the context of disaster management. This section discusses the challenges faced by HEIs in providing lifelong learning effectively and suggests good practices for HEIs to enhance the skills and knowledge of built environment professionals through the provision of lifelong learning. Figure 2 illustrates the framework for HEIs in enhancing the disaster risk reduction capacity through the provision of lifelong learning.

Figure 2: Framework for HEIs to enhance DRR capacities through the provision of lifelong learning

As depicted in Figure 2, the industry demands in the context of disaster are a culture of disaster prevention and resilience; a substantial reduction in disaster losses, availability of DRR knowledge, improved skills and capacity in built environment professionals and efficient and effective post disaster reconstruction of the built and human environment. Learning, education, training and knowledge sharing are the major supply side options that can be facilitated by HEIs. In the process of building skills and capacities within the built environment professions, meeting industry demands with

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the existing level of capacity is a challenge faced by HEIs. To address this challenge, the framework has proposed good practice guidelines for HEIs in order to enhance the DRR capacity of professionals through the provision of lifelong learning. The literature discussed in this paper justifies the provision of lifelong learning as the most appropriate approach for disaster management education. However, the empirical evidence (which was supported by HEI governance including both management and academic staff, researchers, and representatives of government and semi-government organisations relating to the built environment and disaster management) revealed the challenges faced by HEIs in the establishment of a lifelong learning approach within their systems. Having said that, the same empirical evidence also confirmed the importance of accommodating a lifelong learning approach by HEIs. In resolving this contradiction, the research identified ways to overcome the challenges and presented these ways in the form of best practices. As such, these recommendations are proposed to help HEIs minimise the challenges associated with the implementation of lifelong learning and, in turn, to accommodate the lifelong learning approach within their systems more effectively.

As HEIs consist of many members at varying levels of power and authority, it is important to identify the people who would be responsible for the implementation of the proposed good practices. Furthermore, external entities such as industry will also need to contribute for the HEIs to effectively accommodate the lifelong learning approach. The responsible bodies for each proposed good practice are depicted in Figure 2. The responsible parties are largely classified under the following categories (the references are the same as given in Figure 2):

- T – Teaching: Senior lecturers, lecturers, teaching fellows, teaching assistants
- R – Research: Research fellows, research associates, research assistants, principal investigators of research projects
- M – Management: Programme directors, module leaders, mentors, personal tutors, directors of research centres
- G – Governance: Heads of school, Faculty Deans, Vice Chancellors, personnel in the governance unit
- I – Industry: Built environment professionals, construction employers, recruitment agencies, built environment professional bodies, construction industry, organisations working in disaster management such as the United Nations Office for Disaster Risk Reduction

As shown in the Figure, it is clearly evident that collaboration between the different parties is required to effectively implement the good practices proposed. In this context, the major findings on the challenges and good practices are discussed in this section.

The challenges faced by HEIs in accommodating lifelong learning

Industry skills' requirements vary vastly based on the type and size of the organisation, the nature of the business and the magnitude of the projects. The dynamic nature of the market makes it impractical for the industry to have a single voice on their skills' requirements, particularly because of

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the rapidly changing nature of disaster risks. Achieving a balance in providing the right knowledge at the right time is, therefore, a challenge for HEIs.

Traditional student engagement with HEIs is generally limited by course duration. HEIs do not generally follow up with graduates to encourage them to continue to build their knowledge base once the students have left the institutions. Even Universities' alumni associations function more as social networks rather than learning platforms. Thus traditional student engagement acts as a barrier for HEIs in collaborating with their graduates in enhancing their knowledge and skills on a continuous basis.

Most of the built environment programmes provided by HEIs use the traditional face-to-face mode of course delivery. This is the preferred mode by most teaching staff and learners. However, those who want to acquire knowledge while working in the industry find this mode of delivery an obstacle as they do not receive sufficient time for face-to-face learning. A lack of time is one of the major barriers in obtaining lifelong learning and more flexible forms of learning are preferred by built environment professionals. However, HEIs are reluctant to adopt, diffuse and exploit the latest learning and teaching technologies.

The approval process to make changes in the HEI system such as changes to the curriculum and mode of delivery etc. consumes time. Making the process quicker might have an impact on quality assurance. Furthermore, HEIs are expected to ensure the marketability of any new course to avoid financial implications to the institutions in the long run. Such factors prevent HEIs in responding quickly to any emerging needs that may arise soon after a crisis.

The lack of collaboration with industry, professional bodies and communities has also been identified as a major obstacle in providing lifelong learning for built environment professionals particularly in the context of disaster management education. The study found that the nature of collaboration that HEIs have with industries and communities is informal. A formal partnership would be more effective particularly during the disaster reconstruction phase.

Good practices for effective response to industry requirements

Universities are expected to transform research and innovation in order to address the specific needs of the industry. HEIs, therefore, should encourage research initiatives that specifically address disaster management educational needs. Due to the multidisciplinary nature of the subject, incorporating disaster management education as a module into a built environment programme, rather than identifying it as a programme will be more effective. Also, this manner of integration will be faster than developing a new curriculum. Teaching staff who have up-to-date knowledge on the subject is a requisite in educating built environment professionals with such knowledge. A system to assess and support knowledge acquisition in a periodic manner is, therefore, essential. The limited level of disaster related knowledge among HEI teaching staff could be overcome by institutionalising

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formal staff exchange programmes with other HEIs, with industries and professional bodies. Providing students with industry exposure by arranging guest lectures from industry, by training placements or by providing opportunities to research disaster risk reduction related topics for dissertations would help students in updating their skills and knowledge on the subject.

Good practices for close collaboration between HEIs, industries and communities

In most instances knowledge capture and exchange is achieved through various informal means. These include the exchange of ideas at formal and informal gatherings; industry meetings; CPD and workshops; informal links with colleagues and graduates, and industry related literature. Suggestions have been made for HEIs to establish formal partnerships with industry such as with UNISDR and with professional bodies in order to integrate new knowledge into their curriculum. A lack of collaboration between HEIs, professional bodies, industries, other humanitarian agencies and communities has been highlighted as a major barrier in preventing the effective enhancement of disaster risk reduction capacities by HEIs. Therefore, close collaboration between these entities is essential for the delivery of lifelong learning education in disaster management. As such, HEIs are encouraged to strengthen the collaboration between other HEIs, industries, professional bodies and communities. Institutional capacity in terms of teaching and learning resources can also be optimised through such collaborations.

Good practices for lifelong learning via through-life studentship

Learning networks are put forward in order to facilitate lifelong learning opportunities for built environment professionals. Establishing such networks to gain specific types of knowledge such as disaster resilience will help to share relevant knowledge among interested learners. HEIs are encouraged to champion the establishment of such post-study learning networks for their own graduates and to expand the network to other built environment professionals in the industry via snowballing. By doing so, HEIs will keep learners attached to their systems and will encourage them to build up their knowledge base on a continuous basis. One of the major barriers faced by built environment professionals in obtaining lifelong learning is to find time to update their knowledge through formal learning. Thus, introducing or incorporating other forms of learning such as short courses, CPD, e-learning, distance learning etc. within the systems of higher education will help assist in achieving a through-life studentship particularly for those working in the industry. HEIs need to make every effort to create a culture of lifelong learning by encouraging their students to maintain a through-life studentship with their HEIs. An explicit mention of lifelong learning within their curricula will be beneficial. Due to the varied and dynamic nature of market requirements, it is also suggested that students should be encouraged and provided with skills in order to be agile enough to respond to this nature of the industry as making the system agile is not always feasible. As different HEIs will have different areas of expertise, establishing a franchise system to provide lifelong learning on disaster resilience would be useful.

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Good practices for promoting the adoption, diffusion and exploitation of the latest learning and teaching technologies

Lifelong learning could be facilitated by innovative learning and teaching technologies. Thus, promoting the harnessing of learning and teaching technologies in order to facilitate lifelong learning is a recommendation for HEIs as a service enhancement for its current and prospective students. A platform for open educational resources (OER) is another way by which HEIs can contribute to the enhancement of disaster management skills and knowledge on a continuous basis. Investment in an OER platform for disaster risk reduction will help professionals build their knowledge base in a flexible environment. Other information communication and technologies (ICT) based teaching and learning techniques such as online forums, online seminars, virtual classrooms and distance learning provides more flexibility for learners. Such flexibility will help HEIs attract more learners, such as built environment professionals who are working in the industry, and thereby enhance the provision of lifelong learning within HEIs.

Conclusions

The built environment plays a significant role in terms of building the capacity for disaster resilience. Built environment professionals are required to continuously update their skills and knowledge in order to contribute effectively to disaster resilience due to the complexities involved in disaster situations and due to the peculiarities of post-disaster reconstruction. There is a mismatch between the labour market skills' requirements within the built environment sector and those provided by HEIs. The multidisciplinary and dynamic nature of the skills and knowledge required by built environment professionals in order to respond effectively in a disaster situation and the lack of suitable approaches to provide such disaster management education contribute to this mismatch.

A framework based on lifelong learning is, therefore, proposed as an approach that can address the continuous educational needs of built environment professionals dealing with disaster resilience. As such, the contribution of HEIs to enhance DRR capacity through the provision of lifelong learning has been illustrated in the framework. The challenges faced by HEIs in accommodating lifelong learning have been identified. The framework also recommends good practice guidelines for HEIs for effective responses to industry requirements; for close collaboration between HEIs, industries, professional bodies and communities; for lifelong learning via through-life studentships and for promoting the adoption, diffusion and exploitation of the latest learning and teaching technologies. The framework also indicates the parties responsible for implementing the proposed good practices. The framework, therefore, is a useful tool for both HEIs and built environment professionals to enhance disaster risk reduction capacities using lifelong learning.

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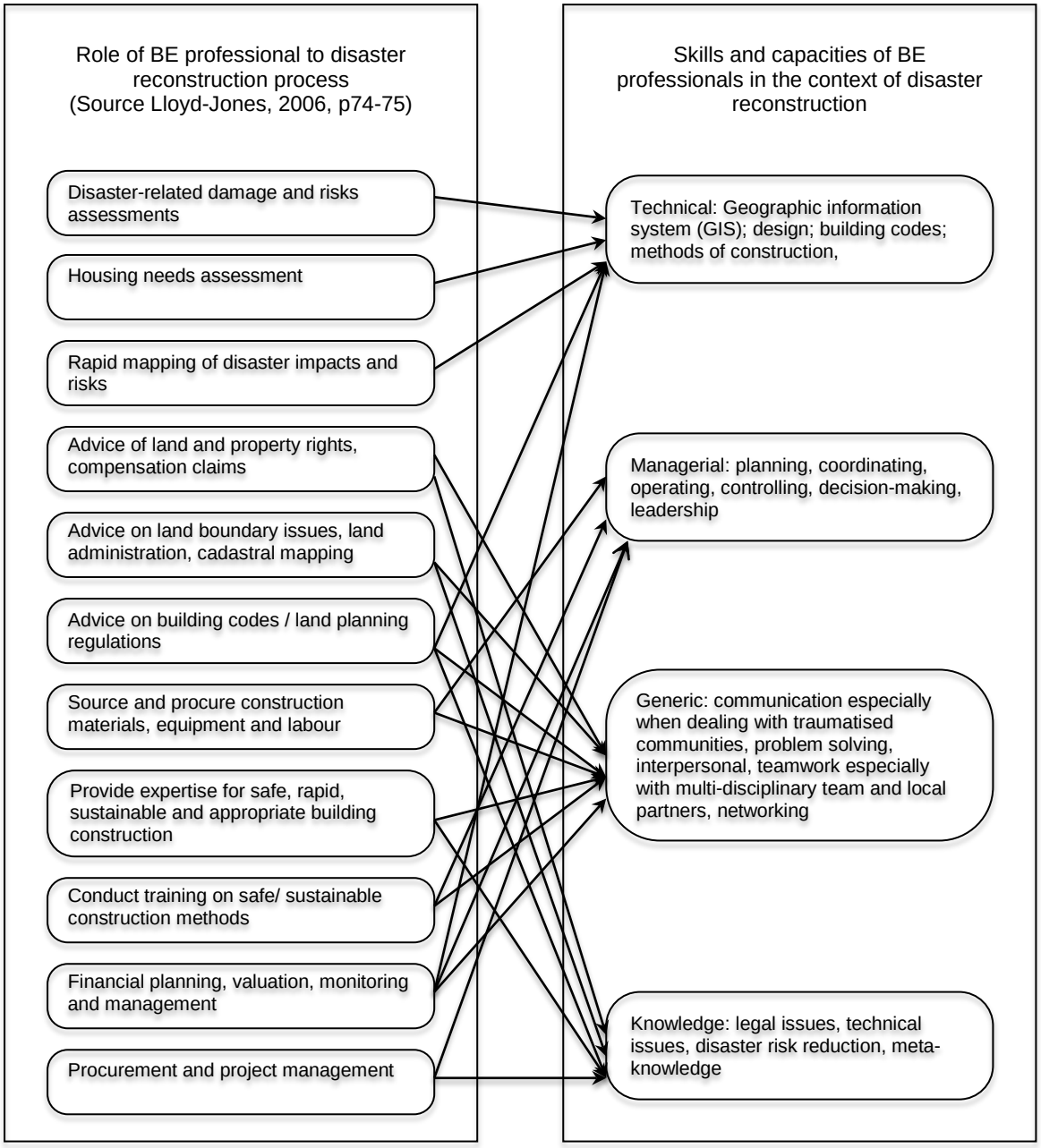

Figure 1: Mapping the skills and capacities of the built environment professionals with their role during post disaster reconstruction

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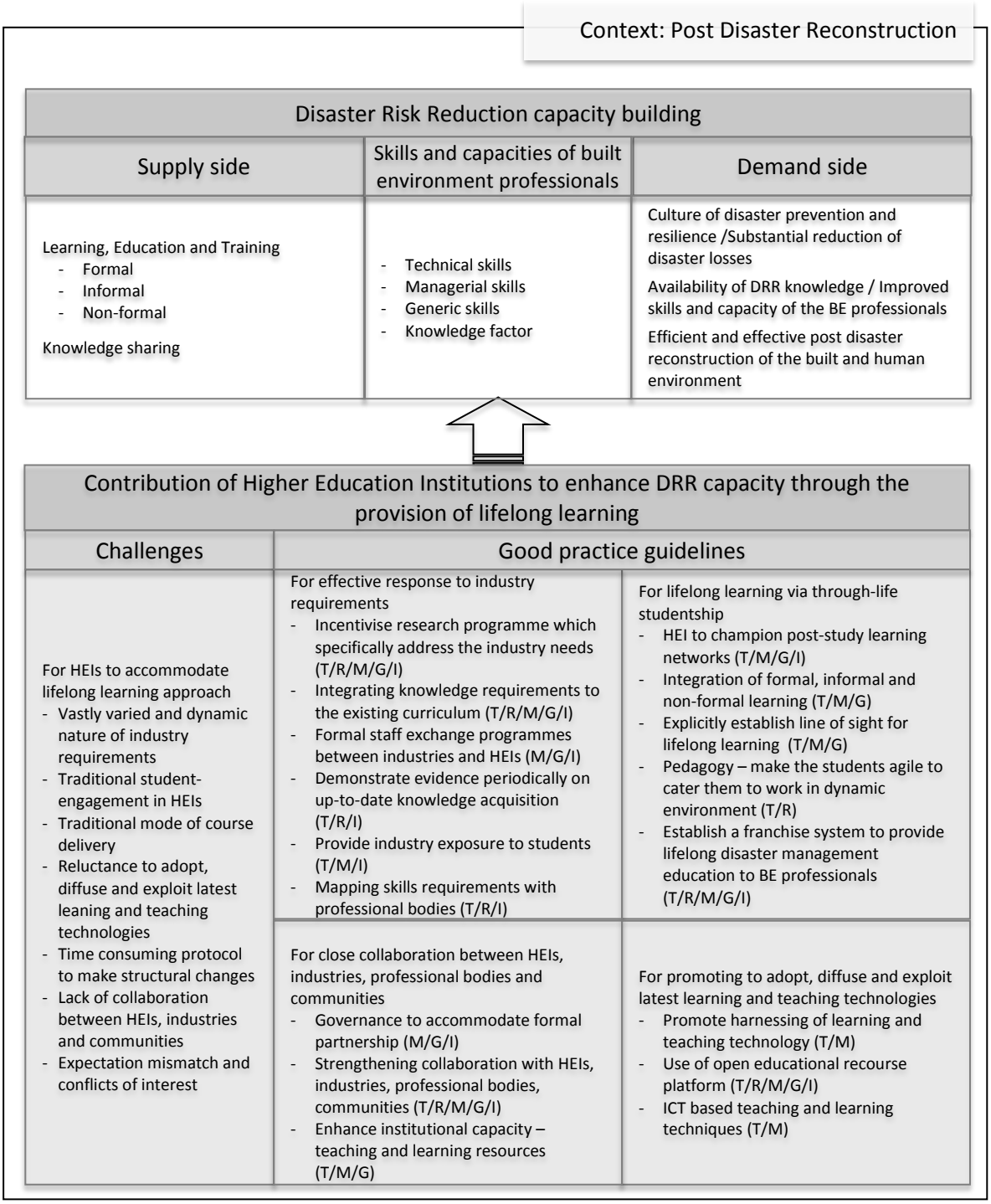

Figure 2: Framework for HEIs to enhance DRR capacities through the provision of lifelong learning

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